

IN THE CLAIMS:

Please substitute the following claims for the same numbered claims in the application.

Claim 1 (Currently Amended): A magnetic-field sensor device comprising:

at least two electrodes;

an insulating layer separating said at least two electrodes; and

at least one layer of chemically-synthesized magnetic nanoparticles disposed at or above a
level with said insulating layer, and disposed between said at least two electrodes.

C 4.9 nm

Claim 2 (Original): The magnetic-field sensor device of claim 1, wherein said at least two electrodes comprise a magnetic material.

Claim 3 (Original): The magnetic-field sensor device of claim 1, wherein at least one of said at least two electrodes comprises a magnetic material.

Claim 4 (Original): The magnetic-field sensor device of claim 1, wherein at least one of said at least two electrodes is one of a non-magnetic metal and a semiconductor.

Claim 5 (Original): The magnetic-field sensor device of claim 1, wherein said chemically-synthesized magnetic nanoparticles range in size between 2 nm and 20 nm in *size*
diameter.

Claim 6 (Original): The magnetic-field sensor device of claim 1, wherein said chemically-synthesized magnetic nanoparticles are oriented with a magnetic-moment orientation parallel to a direction of current flow through said chemically-synthesized magnetic nanoparticles.

Claim 7 (Original): The magnetic-field sensor device of claim 1, wherein said chemically-synthesized magnetic nanoparticles are oriented with a magnetic-moment orientation perpendicular to a direction of current flow through said chemically-synthesized magnetic nanoparticles.

Claim 8 (Original): The magnetic-field sensor device of claim 1, wherein said at least one layer of chemically-synthesized magnetic nanoparticles comprises at least one chemically-synthesized magnetic nanoparticle.

Claim 9 (Original): The magnetic-field sensor device of claim 1, wherein said chemically-synthesized magnetic nanoparticles comprise elements comprising one of Co, Fe, Ni, Mn, Cr, Nd, Pr, Pt, Pd, Ho, Gd, Eu, Er, Re, Rh, an intermetallic compound of said elements, a binary alloy of said elements, a ternary alloy of said elements, an oxide comprising one of Fe, Co, Ni, Mn, and Cr, and a mixed oxide combining at least one of Fe, Co, Ni, Mn, and Cr, with at least one of La, Sr, Ba, and Cu.

Claim 10 (Currently Amended): The magnetic-field sensor device of claim 1, wherein said insulating **organic** layer separates one chemically-synthesized magnetic nanoparticle layer from another chemically- synthesized magnetic nanoparticle layer.

Claim 11 (Currently Amended): A magnetic-field sensor device comprising:

at least two electrodes;

an insulating layer separating said at least two electrodes; and

at least one layer of chemically-synthesized magnetic nanoparticles disposed at or above a level with said insulating layer, and disposed between said at least two electrodes;

wherein said at least one of said at least two electrodes comprise comprises a magnetic material.

Claim 12 (Original): The magnetic-field sensor device of claim 11, wherein at least one of said at least two electrodes comprises a magnetic material.

Claim 13 (Original): The magnetic-field sensor device of claim 11, wherein at least one of said at least two electrodes is one of a non-magnetic metal and a semiconductor.

Claim 14 (Original): The magnetic-field sensor device of claim 11, wherein said chemically-synthesized magnetic nanoparticles range in size between 2 nm and 20 nm in diameter.

Claim 15 (Original): The magnetic-field sensor device of claim 11, wherein said chemically-synthesized magnetic nanoparticles are oriented with a magnetic-moment orientation parallel to a direction of current flow through said chemically-synthesized magnetic nanoparticles.

Claim 16 (Original): The magnetic-field sensor device of claim 11, wherein said chemically-synthesized magnetic nanoparticles are oriented with a magnetic-moment orientation perpendicular to a direction of current flow through said chemically-synthesized magnetic nanoparticles.

Claim 17 (Original): The magnetic-field sensor device of claim 11, wherein said at least one layer of chemically-synthesized magnetic nanoparticles comprises at least one chemically-synthesized magnetic nanoparticle.

Claim 18 (Original): The magnetic-field sensor device of claim 11, wherein said chemically-synthesized magnetic nanoparticles comprise elements comprising one of Co, Fe, Ni, Mn, Cr, Nd, Pr, Pt, Pd, Ho, Gd, Eu, Er, Re, Rh, an intermetallic compound of said elements, a binary alloy of said elements, a ternary alloy of said elements, an oxide comprising one of Fe, Co, Ni, Mn, and Cr, and a mixed oxide combining at least one of Fe, Co, Ni, Mn, and Cr, with at least one of La, Sr, Ba, and Cu.

Claim 19 (Currently Amended): The magnetic-field sensor device of claim ~~10~~ 11, wherein said insulating ~~organic~~ layer separates one chemically-synthesized magnetic nanoparticle layer from another chemically-synthesized magnetic nanoparticle layer.

Claim 20 (Currently Amended): A method of forming a magnetic-field sensor device, said method comprising:

depositing a first electrode onto a substrate;

depositing an electrically insulating layer on said first electrode;

removing a portion of said electrically insulating layer to expose a region of said first electrode;

depositing at least one layer of chemically-synthesized nanoparticles on said electrically insulating layer and said exposed region of said first electrode, wherein said at least one layer of chemically-synthesized nanoparticles is deposited at or above a level with said insulating layer; and

depositing a second electrode on said chemically-synthesized nanoparticles and said electrically insulating layer.

Claim 21 (Original): The method of claim 20, wherein said substrate comprises one of a conducting material and a non-conducting material.

Claim 22 (Original): The method of claim 20, wherein said first and second electrodes comprise

an electrically conducting and magnetic material.

Claim 23 (Original): The method of claim 20, further comprising depositing a layer of magnetic material on said substrate.

Claim 24 (Original): The method of claim 20, wherein said chemically-synthesized nanoparticles comprise elements comprising one of Co, Fe, Ni, Mn, Cr, Nd, Pr, Pt, Pd, Ho, Gd, Eu, Er, Re, Rh, an intermetallic compound of said elements, a binary alloy of said elements, a ternary alloy of said elements, an oxide comprising one of Fe, Co, Ni, Mn, and Cr, and a mixed oxide combining at least one of Fe, Co, Ni, Mn, and Cr, with at least one of La, Sr, Ba, and Cu.

Claim 25 (Currently Amended): A method of forming a magnetic-field sensor device, said method comprising:

depositing a first electrode onto a substrate;

depositing an electrically insulating layer on said first electrode;

depositing a second electrode on said electrically insulating layer;

removing a portion of said electrically insulating layer to create an empty space;

depositing at least one layer of chemically-synthesized nanoparticles in said empty space,

wherein said at least one layer of chemically-synthesized nanoparticles is deposited at or above a level with said insulating layer; and

removing said substrate.

Claim 26 (Original): The method of claim 25, wherein said substrate comprises one of a conducting material and a non-conducting material.

Claim 27 (Original): The method of claim 25, wherein said first and second electrodes comprise an electrically conducting and magnetic material.

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Claim 28 (Original): The method of claim 25, wherein said chemically-synthesized nanoparticles comprise elements comprising one of Co, Fe, Ni, Mn, Cr, Nd, Pr, Pt, Pd, Ho, Gd, Eu, Er, Re, Rh, an intermetallic compound of said elements, a binary alloy of said elements, a ternary alloy of said elements, an oxide comprising one of Fe, Co, Ni, Mn, and Cr, and a mixed oxide combining at least one of Fe, Co, Ni, Mn, and Cr, with at least one of La, Sr, Ba, and Cu.